PATENT ABSTRACTS OF JAPAN

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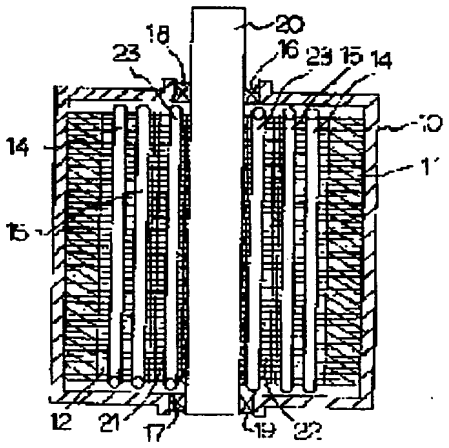
(54) POWER GENERATOR

(57)Abstract:
PROBLEM TO BE SOLVED: To supply electric energy stably without causing any damage on natural environment by arranging a secondary winding to interlink an AC field generated from a primary winding on the stator side and arranging a tertiary winding for inducing a current from the rotating field on the stator side.
SOLUTION: Twelve slots 12 are made in the inner circumferential face of an annular core 11 along the axial direction thereof at regular intervals in the circumferential direction. A primary winding 14 connected with an AC three-phase power supply, i.e., a three-phase symmetric winging of Y connection, is then fitted in the rear of the slot 12. A secondary winding 15, i.e., a three- phase symmetric winging of Y connection, is disposed on the stator side at the front side in the slot 12 such that the secondary winding 15 is interlinked with the AC field generated from the primary winding 14. A tertiary winding 23 for inducing a current from the rotating field is also fitted in the slot 22 as a three-phase symmetric winding of Y-connection. This structure can feed electric energy stably without damaging the natural environment.



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[Claim(s)]
[Claim 1] The generator machine characterized by preparing the tertiary winding to which electromotive force is guided to the rotator side which has a revolving shaft to the revolving-shaft heart of said rotating magnetic field by that rotating magnetic field at least, and a current flows while preparing the primary winding which produces rotating magnetic field in addition to alternating field, and the secondary winding which is produced by this primary winding, and which is allotted so that it may interlink to alternating field at least in a stator side.
[Claim 2] The generator machine characterized by preparing the tertiary winding to which the current to which electromotive force is guided by said rotating magnetic field at least flows in a stator side while preparing the primary winding which produces rotating magnetic field in addition to alternating field, and the secondary winding which is produced by this primary winding, and which is allotted so that it may interlink to alternating field at least in the rotator side which has a revolving shaft to the revolving-shaft heart of said rotating magnetic field.
[Claim 3] The generator machine according to claim 1 or 2 characterized by supplying a part of electromotive force [at least] guided to said secondary winding and/or tertiary winding to said primary winding.
[Claim 4] Claim 1 characterized by for this secondary winding interlinking also to said rotating magnetic field, and electromotive force being guided to said secondary winding by that rotating magnetic field in addition to said alternating field thru/or a generator machine given in either of 3.

[Claim 5] Claim 1 characterized by for this tertiary winding interlinking also to said alternating field, and electromotive force being guided to said tertiary winding by that alternating field in addition to said rotating magnetic field thru/or a generator machine given in either of 4.
[Claim 6] The alternating field and rotating magnetic field which are produced by said primary winding are claim 1 characterized by being generated by the polyphase current including a direct current, a single-phase alternative current, a two phase alternating current, or the three-phase alternating current thru/or a generator machine given in either of 5.
[Claim 7] Said primary winding and secondary winding are claim 1 characterized by being arranged in the same magnetic circuit thru/or a generator machine given in either of 5.
[Claim 8] Claim 1 characterized by adjusting the electrical potential difference and current of the electromotive force guided to this secondary winding by the turn ratio of said primary winding and secondary winding thru/or a generator machine given in either of 5.
[Claim 9] Claim 1 characterized by adjusting the electrical potential difference and current of the electromotive force guided to this tertiary winding by the turn ratio of said primary winding and tertiary winding thru/or a generator machine given in either of 5.

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the generator machine as a source of electrical energy which supplies electrical energy to a converter, a load circuit, etc. by self generating in more detail about a generator machine.
[0002]
[Description of the Prior Art] Conventionally, there is the following as this kind of a generator machine.
a) The hydro-electric power generating device which produces electrical energy using the fall energy of the water in a high place.

b) The thermal power generating device which produces electrical energy using the heat energy of a fuel like coal, a fuel oil, and combustible gas.
c) The nuclear-electric-power-generation device which produces electrical energy using the emission energy which the reaction of the process of nuclear fission depends.
d) The solar generator machine which produces electrical energy using the solar energy of solar heat energy or solar light energy.
e) The wind power device which produces electrical energy using wind-force energy.
f) The chemistry generator machine which produces electrical energy using the chemical energy based on the chemical reaction which gives the product of a low energy content occurring, the so-called cell.
[0003]
[Problem(s) to be Solved by the Invention] However, there are the following troubles in each generator machine mentioned above. Are on the natural environment according to dam construction in a hydro-electric power generating device, and they are a carbon dioxide, NOx, and SOx in a thermal power generating device. In addition, there is a trouble on the natural environment based on abandonment processing of heavy metal, such as mercury on [of an on / the natural environment based on the air pollution by exhaust gas / like] the natural environment according to nuclear accident and nuclear waste in a nuclear-electric-power-generation device further used for a cell at a chemical reaction, nickel, and KADONIUMU.
[0004] On the other hand, although a solar generator machine and a wind power device do not have a bad influence on natural environment, since the days which can be used in every year with a solar generator vessel are restricted, they have a trouble on adequate supply of electrical energy by the wind power device for the intermittency of wind-force energy.
[0005] This invention carries out the purpose of solving such a trouble, is stabilized without destroying natural environment, can supply electrical energy, and is to offer the generator machine based on a new principle miniaturizable moreover.

[0006]
[Means for Solving the Problem and its Function and Effect] The primary winding which produces rotating magnetic field in addition to alternating field in order that the generator machine by this invention may attain the purpose mentioned above, While preparing the secondary winding which is produced by this primary winding and which is allotted so that it may interlink to alternating field at least in a stator side The tertiary winding to which electromotive force is guided to the rotator side which has a revolving shaft to the revolving-shaft heart of said rotating magnetic field by the rotating magnetic field at least, and a current flows is prepared, Or while preparing the primary winding which produces rotating magnetic field in addition to alternating field, and the secondary winding which is produced by this primary winding and which is allotted so that it may interlink to alternating field at least in the rotator side which has a revolving shaft to the revolving-shaft heart of said rotating magnetic field It is preparing the tertiary winding to which electromotive force's is guided by said rotating magnetic field at least, and a current's flows in a stator side.
[0007] Thus, if constituted, the electromotive force by the alternating field produced by the alternate magnetic flux by the exciting current which flows to a primary winding will be guided to a secondary winding by alternating field at least. Moreover, at least, the electromotive force by the rotating magnetic field produced by the alternate magnetic flux by the exciting current which flows to a primary winding similarly is guided to a tertiary winding by rotating magnetic field, and the induced current flows. By the way, since the electromotive force guided to a secondary winding based on alternating field becomes almost equal to what deducted loss of some, such as copper loss and iron loss, from the power supplied in order to pass an exciting current to a primary winding, a large next door and self generating are performed rather than the power with which the electromotive force with which the electromotive force guided to a tertiary winding based on rotating magnetic

field is conjointly guided to a secondary winding and a tertiary winding, and which was put together was supplied to the primary winding.

[0008] Moreover, the rotation drive of the rotator is carried out to it being also at the electromagnetic force by rotating magnetic field and its induction field by the induction field based on the induced current which flows to a tertiary winding. Therefore, being able to use as an induction motor, it can be stabilized without destroying natural environment, electrical energy can be supplied, and, moreover, it can miniaturize.

[0009] If it constitutes so that a part of electromotive force [at least] guided to said secondary winding and/or tertiary winding may be supplied to said primary winding, self generating will be performed without needing supply of the electrical energy from the outside except for the time of early starting.

[0010] In addition, it is desirable that the secondary winding interlinks to said secondary winding also at said rotating magnetic field, and electromotive force is guided by the rotating magnetic field in addition to said alternating field, and it is desirable that the tertiary winding interlinks to said tertiary winding also at said alternating field, and electromotive force is guided by the alternating field in addition to said rotating magnetic field. Moreover, the alternating field and rotating magnetic field which are produced by said primary winding may be produced from a polyphase current including a direct current, a single-phase alternative current, a two phase alternating current, or the three-phase alternating current.

[0011] By the way, the period of the direct current to which the number of alternation of the alternating field produced by the polyphase current including said direct current, a single-phase alternative current, a two phase alternating current, or the three-phase alternating current and the rotational frequency of rotating magnetic field are passed intermittently in a direct current is shortened, and the electromotive force which the period of the alternating current is shortened in the case of a single-phase alternative current,

a two phase alternating current, and a polyphase current, and is guided to size then said secondary winding, and a tertiary winding serves as size. Moreover, if it constitutes so that it may be the multi-electrode volume in which said primary winding is the symmetry volume of the polyphase containing a three phase, and contains 4 ****, the electromotive force guided to said secondary winding and tertiary winding will serve as size as the source resultant pulse number of a polyphase volume and the pole of a multi-electrode volume increase. In addition, as for said secondary winding and tertiary winding, it is desirable that it is the symmetry volume of said primary winding and number of inphases in this case.

[0012] Moreover, as for the electrical potential difference and current of the electromotive force guided to said secondary winding and tertiary winding, it is desirable to adjust by the turn ratio of said primary winding and secondary winding and the turn ratio of said primary winding and tertiary winding. In addition, as for said primary winding and secondary winding, it is desirable that are arranged in the same magnetic circuit, and the coil part to which said primary winding and a secondary winding each correspond further approaches, and is arranged in the iron core which constitutes said same magnetic circuit.

[0013] Other purposes of this invention are made clear from the detailed explanation mentioned later. However, although detailed explanation and a detailed concrete example explain the most desirable embodiment, since it is clear from the detailed explanation for this contractor, various modification and deformation of the pneuma of this invention and within the limits are described only as a concrete example.

[0014]

[Example] Next, it explains, referring to a drawing to sequential per concrete example of the generator machine by this invention.

[0015] In drawing 1 and drawing 2 , the stator frame 10 is fixed in the shape of the same axle in the stator frame 10 of the shape of a cylindrical shape which has a vertical wall, and the circular ring tubed iron core 11 currently built by carrying

out the laminating of the circular ring sheet steel is established. the inner skin side of this circular ring tubed iron core 11 -- a hoop direction -- regular intervals -- and 12 slots 12 are formed along that direction of an axis. It is allotted and is inserted in the back side within these slots 12 as drawing 4 (a) is indicated that U plane 1 coil 14A which is the primary winding 14 connected to the three-phase-alternating-current power source 13 as shown in drawing 3 , V plane 1 coil 14B, and W plane 1 coil 14C are also for the three phase symmetry volume of Y connection. Moreover, it is allotted and is inserted in the near side within a slot 12 as U2 phase-winding 15A and V2 phase-winding 15B and W2 phase-winding 15C which is the secondary winding 15 currently illustrated is similarly shown to drawing 4 (b) that the three phase symmetry volume of Y connection is also.

[0016] By the way, this circular ring tubed iron core 11 and the cylindrical iron core 21 currently built by having the revolving shaft 20 currently supported free [rotation] through each bearings 18 and 19 by each holes 16 and 17 which in other words are located in the axis of the cylindrical shape-like stator frame 10, and are prepared in the vertical wall of the stator frame 10, and being fixed to that revolving shaft 20 in the shape of the same axle, and carrying out the laminating of the circular ring sheet steel are established in the centrum within the circular ring tubed iron core 11. the peripheral face side of this cylindrical iron core 21 -- a hoop direction -- regular intervals -- and 12 slots 22 are similarly formed along that direction of an axis. In these slots 22, it is allotted and is inserted as U three-phase-circuit coil 23A which is the tertiary winding 23 shown in drawing 3 , V three-phase-circuit coil 23B, and W3 phase-winding 23C are similarly shown to drawing 4 (c) that the three phase symmetry volume of Y connection is also.

[0017]

[Formula 1]

なお、図2および図4（a），（b），（c）における符号①～⑫はスロット番号を示している。

In this way, if the balanced three-phase alternating currents ia1, ib1, and ic1 are passed as shown in U plane 1 coil 14A which is a primary winding 14, V plane 1 coil 14B, and W plane 1 coil 14C as an exciting current from the three-phase-alternating-current power source 13 at drawing 3 and drawing 4 (a) Each alternating field 24 and the rotating magnetic field 25 which rotate one time clockwise between the two cycles of the balanced three-phase alternating currents ia1, ib1, and ic1 arise as shown to drawing 5 by the alternate magnetic flux produced by these balance three-phase alternating currents ia1, ib1, and ic1. On the other hand, the linkage of U2 phase-winding 15A and V2 phase-winding 15B and W2 phase-winding 15C which is a secondary winding 15 is carried out to each [these] alternating field 24 and rotating magnetic field 25. the electromotive force by each alternating field 24 and rotating magnetic field 25 guides to these U2 phase-winding 15A and V2 phase-winding 15B and W2 phase-winding 15C -- having -- drawing 3 R> 3 and drawing 4 -- the balanced three-phase alternating currents ia2, ib2, and ic2 flow as shown in </A (b)> . In addition, said revolving shaft 20 will be located in the revolving-shaft heart of this rotating magnetic field 25.

[0018] Moreover, the linkage of U three-phase-circuit coil 23A which is a tertiary winding 23, V three-phase-circuit coil 23B, and W3 phase-winding 23C is carried out to the rotating magnetic field 25 similarly produced by the primary winding 14, and the balanced three-phase alternating currents ia3, ib3, and ic3 flow as electromotive force is guided to these U three-phase-circuit coil 23A, V three-phase-circuit coil 23B, and W3 phase-winding 23C and it is shown in drawing 3 and drawing 4 (c) . The circular ring tubed iron core 11 is made into a stator side by the induction field based on these induced currents ia3, ib3, and ic3 for it to be also at the electromagnetic force by these rotating magnetic fields 25 and induction field, and the rotation drive of the cylindrical iron core 21 as the rotator side is carried out by making the cylindrical iron core 21 into a rotator side.

[0019] Thus, the electromotive force guided to a secondary winding 15 and a tertiary winding 23 In a secondary winding 15, the alternating field 24 by the primary winding 14 and the induced electromotive force by rotating magnetic field 25 further An additive rate, From the power of the balanced three-phase alternating currents ia1, ib1, and ic1 with which the electromotive force guided to a secondary winding 15 based on alternating field 24 flowed to the primary winding 14 to and copper loss Since it becomes almost equal to what deducted loss of some, such as iron loss, it becomes size from the power supplied to the primary winding 14, and self generating is performed.

[0020] 'The 1st circular ring tubed iron core 11 corresponding to said circular ring tubed iron core 11 fixed by the low wall of the stator frame 10' in the shape of the same axle inside' is established. moreover, it is shown in drawing 6 and drawing 7 -- as -- the cylindrical shape-like stator frame 10 -- this -- the -- one -- a circular ring -- tubed -- an iron core -- 11 -- ' -- a peripheral face -- a stator -- a frame -- ten -- ' -- inner skin -- Hazama -- a circular ring -- tubed -- space -- fitting in loosely -- having -- said -- cylindrical -- an iron core -- 21 -- corresponding -- the -- two -- a circular ring -- tubed -- an iron core -- 21 -- ' -- illustrating -- having -- **** -- as -- a cylinder -- a frame -- 26 -- the inside -- fixing -- making -- preparing -- you may make . At a back side to the peripheral face side of 1st circular ring tubed iron core 11' In this case, primary-winding 14', Slot 12' matched for a near side with secondary-winding 15' is formed. Slot 22' matched for the inner skin side of 2nd circular ring tubed iron core 21' with tertiary-winding 23' is formed, and also revolving-shaft 20of 2nd circular ring tubed iron core 21'' sets to the centrum of 1st circular ring tubed iron core 11'. Moreover, the axis of the 1st circular ring tubed iron core 11', In other words, it is [being located in the revolving-shaft heart of rotating magnetic field, etc. and] the same as that of the above-mentioned.

[0021] In addition, in this example, although the case of the

three-phase-circuit alternating current 4 pole concentration (all knots) volume of a lap winding was made into the example and explained, it is made six slots, is made a three-phase-circuit alternating current 2 pole concentration (all knots) volume and 36 more slots, and it cannot be overemphasized that you may be three-phase-circuit alternating current 4 pole distribution (all knots). Moreover, although the circular ring tubed iron core 11 and circular ring tubed iron core 11of ** 1st' were made into the stator side and the cylindrical iron core 21 and circular ring tubed iron core 21of ** 2nd' were explained as a rotator side, the circular ring tubed iron core 11 and circular ring tubed iron core 11of ** 1st' are made to have a revolving shaft, the circular ring tubed iron core 11 and 11' are made into a rotator side, and it is good also considering the cylindrical iron core 21 and circular ring tubed iron core 21of ** 2nd' as a stator side.

[0022] this example -- setting -- a slot 12 and 12' -- although a primary winding 14 and 14' were allotted to the inner back side and a secondary winding 15 and 15' were allotted to the near side, conversely, a primary winding 14 and 14' may be allotted to a secondary winding 15, 15' may be allotted to a back side at a near side, and a primary winding 14, 14' and a secondary winding 15, and 15' may be allotted with no distinction from a near-side side and a back side. Moreover, although the case of the three phase symmetry volume of Y connection was explained, you may be the three phase symmetry volume of delta connection. Furthermore, although the case of a lap winding was explained, you may be a wave winding or a chain winding, and although the case of a full pitch winding was explained, you may be a short pitch winding, and so to speak, you may be what kind of coil approach.

[0023] In this example, as long as it is an iron core 11, 11', and the thing that it may wind and 21 and 21' may be built although the laminating of the sheet steel was carried out and it was built, may be massive, may carry out sinter of the ferrite, may build it, and consists of the magnetic substance so to speak, you may be what kind of thing.

[0024] In this example, although the three-phase-alternating-current power source 13 was used in order to pass an exciting current by making a primary winding 14 and 14' into a three phase volume, in order to pass an exciting current, a single-phase alternative current power source is used, and it constitutes in a capacitor split-phase type, a reactance split-phase type, or dark circles and a ** coil form, and is good also considering a primary winding 14 and 14' as a configuration of a two phase volume. moreover, single phase Maki 14" according primary-winding 14" to three coils as shown in drawing 8 -- as A and 14 "B, 14" C -- DC power supply 30 -- using -- six SCRs1 - SCR6 from -- you may make it pass intermittently exciting currents ia1, ib1, and ic1 one by one through the switching circuit 31 constituted In addition, a secondary winding 15, 15' and a tertiary winding 23, and 23' are made to correspond to a primary winding 14, the single phase volume of 14', a two phase volume, a three phase volume, etc., and should just be taken as the same single phase volume, a two phase volume, a three phase volume, etc.

[0025] In this example, although a secondary winding 15 and 15' depend a secondary winding 15 and the electromotive force guided to 15' on a linkage being carried out at the alternating field 24 and rotating magnetic field 25 based on the alternate magnetic flux produced in a primary winding 14'14, a secondary winding 15 and 15' cannot be overemphasized by that you may constitute so that a linkage may be carried out only to said alternating field 24. Moreover, in this example, although a tertiary winding 23 and 23' depend a tertiary winding 23 and the electromotive force guided to 23' on a linkage being carried out at a primary winding 14 and the rotating magnetic field 25 based on the alternate magnetic flux produced in 14', it cannot be overemphasized that you may constitute so that it may interlink also to the alternating field 24 based on said alternate magnetic flux in addition to this rotating magnetic field 25.

[0026] If a part of electromotive force [at least] guided to a secondary winding 15, 15' and/or a tertiary winding 23, and

23' in each above-mentioned example and each above-mentioned modification is supplied to a primary winding 14 and 14', it has a function also as self generating and also an induction motor, without needing supply of the electrical energy from the outside except for the time of early starting. Moreover, the period of the current which flows to a primary winding 14 and 14' is shortened, and it cannot be overemphasized that size, then a secondary winding 15, 15' and a tertiary winding 23 and the electromotive force guided to 23' serve as size in the number of alternation of alternating field 24 and the rotational frequency of rotating magnetic field 25 as the source resultant pulse number of a polyphase volume increases again. in addition -- a primary winding -- 14 -- 14 -- ' -- a secondary winding -- 15 -- 15 -- ' -- and -- a tertiary winding -- 23 -- 23 -- ' -- setting -- a rotator -- a side -- allotting -- having -- a case -- **** -- supplying -- having -- a current -- and it is guided -- electromotive force -- the slip ring -- minding -- supply -- or it can take out.

[0027] According to this invention, self generating which is stabilized without destroying natural environment and can supply electrical energy can be performed, and self generating can carry out, without moreover needing supply of the electrical energy from the outside except for the time of early starting. Therefore, it is [in / including a noncommercial use which is making the motor drive that it is also with the electrical energy / all electrical machinery and apparatus] very useful as well as especially the thing for which the conventional hydro-electric power generating device, a thermal power generating device, a nuclear-electric-power-generation device, a solar generator machine, a wind power device, a cell, etc. can be replaced, and electrical energy can be supplied.

[0028] as explained above, various this inventions can be alike and it can change are clear. Such all deformation clear for this contractor and modification are included in a claim, without such modification being contrary to the pneuma and the range of this invention.

[Brief Description of the Drawings]

[Drawing 1] Drawing 1 is drawing of longitudinal section for explaining the 1st example of the generator machine by this invention.

[Drawing 2] Drawing 2 is the cross-sectional view of the generator machine explained in drawing 1 .

[Drawing 3] Drawing 3 is the circuit diagram explained in drawing 1 .

[Drawing 4] Drawing 4 (a), (b), and (c) are the coil Figs. explained in drawing 1 .

[Drawing 5] Drawing 5 is the generating Fig. of rotating magnetic field explained in drawing 1 .

[Drawing 6] Drawing 6 is drawing of longitudinal section for explaining the 2nd example of the generator machine by this invention.

[Drawing 7] Drawing 7 is the cross-sectional view of the generator machine explained in drawing 6 .

[Drawing 8] Drawing 8 is a circuit diagram for explaining the modification at the time of supplying an exciting current to the primary winding in the generator machine by this invention.

[Description of Notations]

10 10' Stator frame

11 11' Circular ring tubed iron core (1st circular ring tubed iron core)

12, 22, 12', 22' Slot

13 Three-phase-Alternating-Current Power Source

14, 14', 14" Primary winding

15 15' Secondary winding

16 17 Hole

18 19 Bearing

20 20' Revolving shaft

21 21' Cylindrical iron core (2nd cylindrical iron core)

23 23' Tertiary winding

24 Alternating Field

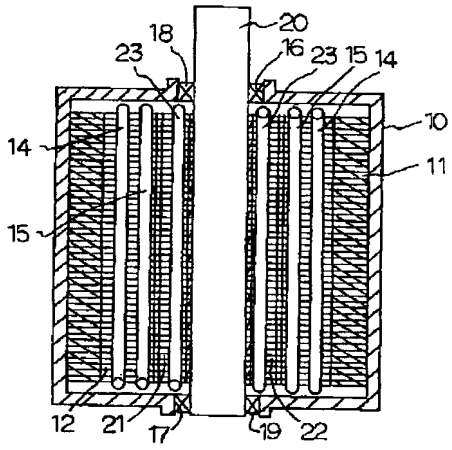
25 Rotating Magnetic Field

26 Cylinder Frame

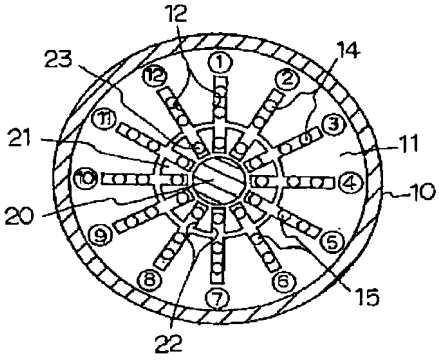
30 DC Power Supply

31 Switching Circuit

[Drawing 1]



[Drawing 2]



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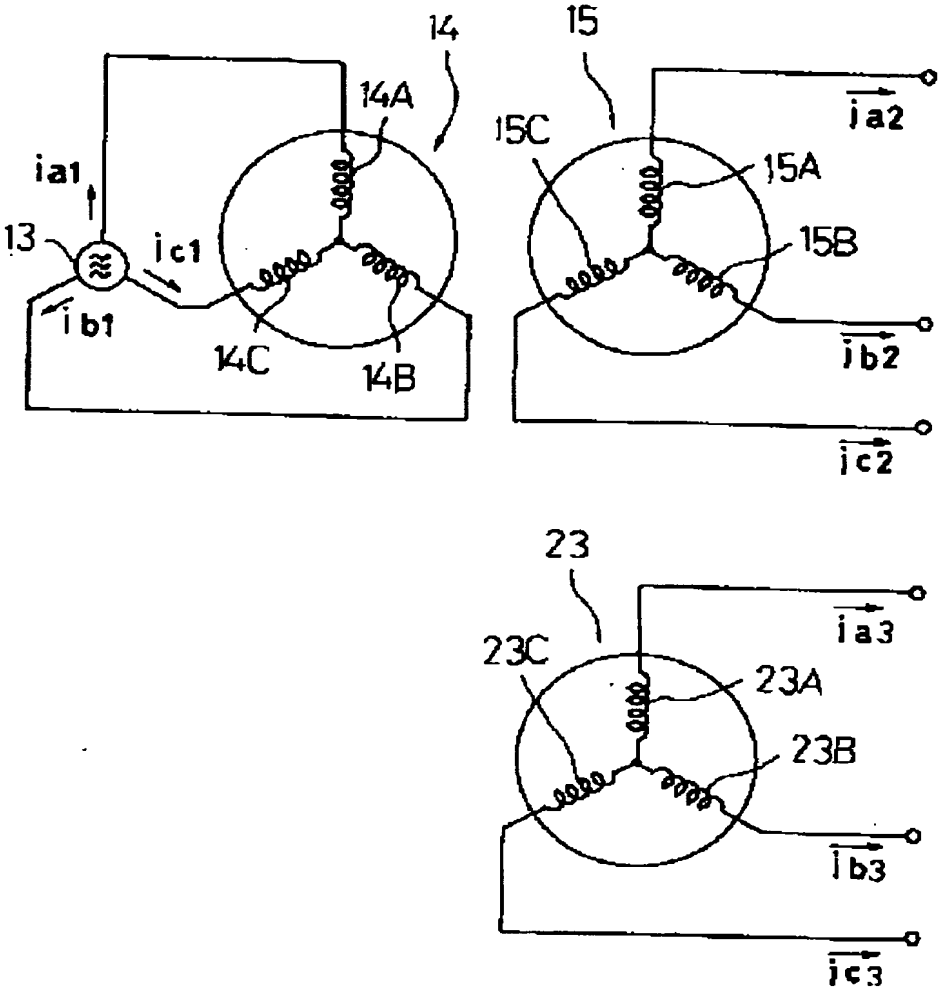
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14A
ia1
13
ic1
ib1
14C
14B
15
15C
15A
15B
ia2
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ic2
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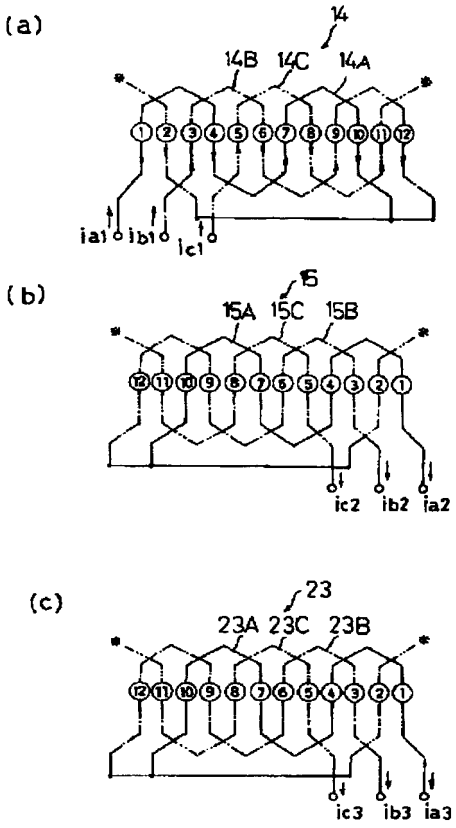
23C
23A
23B
ia3
ib3
ic3

[Drawing 4]



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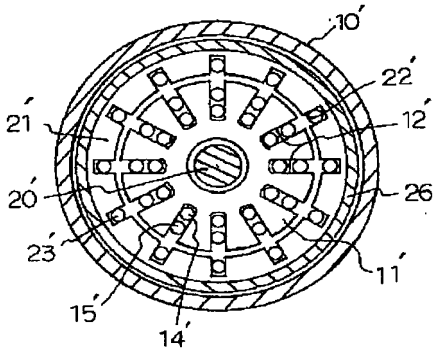
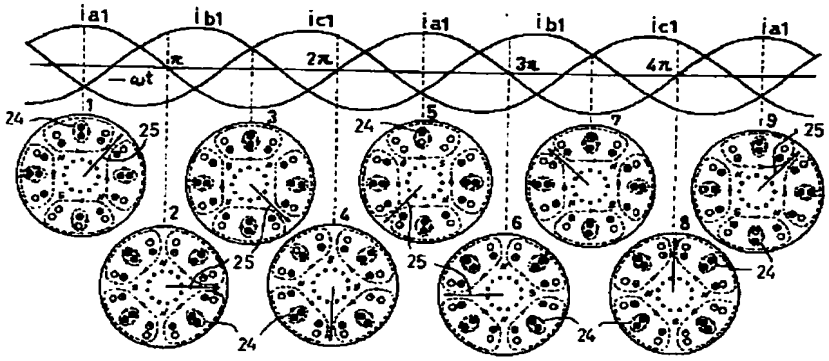


[Drawing 5]



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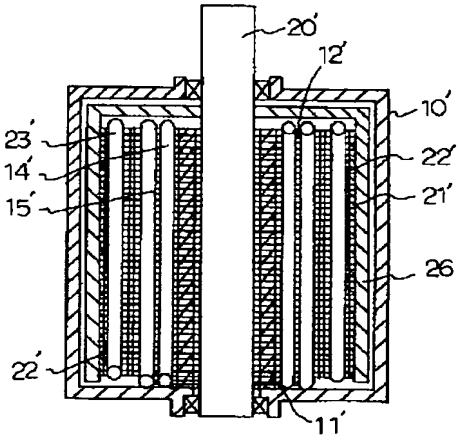
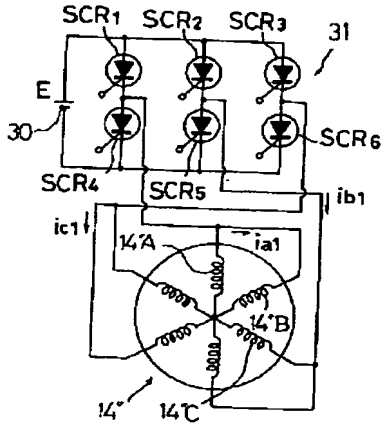


[Drawing 8]



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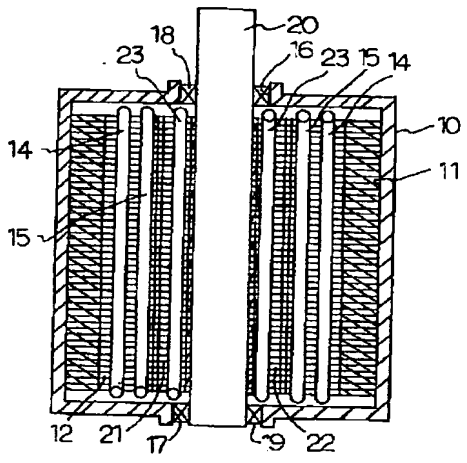
(54)【発明の名称】　発電機器

(57)【要約】

【課題】　自然環境を破壊することなくかつ安定して電気エネルギーを供給することができ、しかもコンパクト化が可能な新規な原理にもとづく発電機器を提供することを目的とする。

【解決手段】　交番磁界に加えて回転磁界を生じさせる一次巻線と、この一次巻線により生ずる少なくとも交番磁界に鎖交するように配される二次巻線とを固定子側に設けるとともに、前記回転磁界の回転軸芯に回転軸を有する回転子側に少なくともその回転磁界により起電力が誘導されて電流が流れる三次巻線を設ける構成とする。



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【特許請求の範囲】

【請求項１】　交番磁界に加えて回転磁界を生じさせる一次巻線と、この一次巻線により生ずる少なくとも交番磁界に鎖交するように配される二次巻線とを固定子側に設けるとともに、前記回転磁界の回転軸芯に回転軸を有する回転子側に少なくともその回転磁界により起電力が誘導されて電流が流れる三次巻線を設けることを特徴とする発電機器。

【請求項２】　交番磁界に加えて回転磁界を生じさせる一次巻線と、この一次巻線により生ずる少なくとも交番磁界に鎖交するように配される二次巻線とを前記回転磁界の回転軸芯に回転軸を有する回転子側に設けるとともに、少なくとも前記回転磁界により起電力が誘導される電流が流れる三次巻線を固定子側に設けることを特徴とする発電機器。

【請求項３】　前記二次巻線および／または三次巻線に誘導される起電力の少なくとも一部を前記一次巻線に供給することを特徴とする請求項１または２に記載の発電機器。

【請求項４】　前記二次巻線には、この二次巻線が前記回転磁界にも鎖交して前記交番磁界に加えてその回転磁界によっても起電力が誘導されることを特徴とする請求項１乃至３のうちのいずれかに記載の発電機器。

【請求項５】　前記三次巻線には、この三次巻線が前記交番磁界にも鎖交して前記回転磁界に加えてその交番磁界によっても起電力が誘導されることを特徴とする請求項１乃至４のうちのいずれかに記載の発電機器。

【請求項６】　前記一次巻線により生じる交番磁界および回転磁界は、直流，単相交流，二相交流，または三相交流を含む多相交流により生じることを特徴とする請求項１乃至５のうちのいずれかに記載の発電機器。

【請求項７】　前記一次巻線および二次巻線は、同一磁気回路に配設されることを特徴とする請求項１乃至５のうちのいずれかに記載の発電機器。

【請求項８】　前記一次巻線と二次巻線との巻数比によって、この二次巻線に誘導される起電力の電圧・電流を調節することを特徴とする請求項１乃至５のうちのいずれかに記載の発電機器。

【請求項９】　前記一次巻線と三次巻線との巻数比によって、この三次巻線に誘導される起電力の電圧・電流を調節することを特徴とする請求項１乃至５のうちのいずれかに記載の発電機器。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は、発電機器に関し、より詳しくは自己発電により電気エネルギーを、例えば変換器，負荷回路などに供給する電気エネルギー源としての発電機器に関するものである。

【０００２】

【従来の技術】従来、この種の発電機器としては、次のようなものがある。

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ａ）高い所にある水の落下エネルギーを利用して電気エネルギーを生じさせる水力発電機器。

ｂ）石炭、重油、可燃ガスのような燃料の熱エネルギーを利用して電気エネルギーを生じさせる火力発電機器。

ｃ）核分裂の過程の反応のよる放出エネルギーを利用して電気エネルギーを生じさせる原子力発電機器。

ｄ）太陽熱エネルギーまたは太陽光エネルギーの太陽エネルギーを利用して電気エネルギーを生じさせる太陽発電機器。

ｅ）風力エネルギーを利用して電気エネルギーを生じさせる風力発電機器。

ｆ）低エネルギー含量の生成物を与える化学反応が起こることにもとづく化学エネルギーを利用して電気エネルギーを生じさせる化学発電機器、いわゆる電池。

【０００３】

【発明が解決しようとする課題】しかしながら、前述された各発電機器においては、次のような問題点がある。水力発電機器にはダム建設による自然環境上の、また火力発電機器には二酸化炭素，NO_x，SO_xのような排気ガスによる大気汚染にもとづく自然環境上の、更には原子力発電機器には核事故および核廃棄物による自然環境上の、加えて電池には化学反応に用いる水銀，ニッケル，カドニウムなどの重金属の廃棄処理にもとづく自然環境上の問題点がある。

【０００４】一方、太陽発電機器および風力発電機器は、自然環境には悪影響を与えないが、太陽発電機器では年間において利用できる日数が制限されるために、また風力発電機器では風力エネルギーの間欠性のために電気エネルギーの安定供給上の問題点がある。

【０００５】本発明は、このような問題点を解決することを目的して、自然環境を破壊することなくかつ安定して電気エネルギーを供給することができ、しかもコンパクト化が可能な新規な原理にもとづく発電機器を提供することにある。

【０００６】

【課題を解決するための手段および作用・効果】本発明による発電機器は、前述された目的を達成するために、交番磁界に加えて回転磁界を生じさせる一次巻線と、この一次巻線により生ずる少なくとも交番磁界に鎖交するように配される二次巻線とを固定子側に設けるとともに、前記回転磁界の回転軸芯に回転軸を有する回転子側に少なくともその回転磁界により起電力が誘導されて電流が流れる三次巻線を設けること、または交番磁界に加えて回転磁界を生じさせる一次巻線と、この一次巻線により生ずる少なくとも交番磁界に鎖交するように配される二次巻線とを前記回転磁界の回転軸芯に回転軸を有する回転子側に設けるとともに、少なくとも前記回転磁界により起電力が誘導されて電流が流れる三次巻線を固定子側に設けることである。

【０００７】このように構成すれば、一次巻線に流れる励磁電流による交番磁束によって生じる少なくとも交番磁界により、二次巻線にはその交番磁界による起電力が誘導される。また、同様に一次巻線に流れる励磁電流による交番磁束によって生じる少なくとも回転磁界により、三次巻線にはその回転磁界による起電力が誘導され、誘導電流が流れる。ところで、交番磁界にもとづき二次巻線に誘導される起電力は、一次巻線に励磁電流を流すために供給された電力から銅損、鉄損などの若干の損失を差引いたものとほぼ等しくなることから、回転磁界にもとづき三次巻線に誘導される起電力とも相俟って、二次巻線および三次巻線に誘導される合わさった起電力は一次巻線に供給された電力よりも大となり、自己発電が行われる。

【０００８】また、三次巻線に流れる誘導電流にもとづく誘導磁界により回転磁界とその誘導磁界とによる電磁力でもって回転子が回転駆動される。したがって、誘導電動機として用いることができながら、自然環境を破壊することなくかつ安定して電気エネルギーを供給することができ、しかもコンパクト化が可能である。

【０００９】前記二次巻線および／または三次巻線に誘導される起電力の少なくとも一部を前記一次巻線に供給するように構成すれば、初期の始動時を除き外部からの電気エネルギーの供給を必要とすることなく自己発電が行われる。

【００１０】なお、前記二次巻線にはその二次巻線が前記回転磁界にも鎖交して前記交番磁界に加えてその回転磁界によっても起電力が誘導されることが好ましく、また前記三次巻線にはその三次巻線が前記交番磁界にも鎖交して前記回転磁界に加えてその交番磁界によっても起電力が誘導されることが好ましい。また、前記一次巻線により生じる交番磁界および回転磁界は、直流，単相交流，二相交流，または三相交流を含む多相交流より生じ得る。

【００１１】ところで、前記直流，単相交流，二相交流，または三相交流を含む多相交流によって生じる交番磁界の交番数および回転磁界の回転数を、例えば直流の場合は断続的に流す直流の周期を短くして、また単相交流，二相交流および多相交流の場合はその交流の周期を短くして大とすれば、前記二次巻線および三次巻線に誘導される起電力が大となる。また、前記一次巻線が、三相を含む多相の対称巻でかつ４極巻を含む多極巻であるように構成すれば、多相巻の相数および多極巻の極数が増すにつれて前記二次巻線および三次巻線に誘導される起電力が大となる。なお、この場合に前記二次巻線および三次巻線は、前記一次巻線と同相数の対称巻であることが好ましい。

【００１２】また、前記二次巻線および三次巻線に誘導される起電力の電圧・電流は、前記一次巻線と二次巻線との巻数比、また前記一次巻線と三次巻線との巻数比によって調節することが好ましい。なお、前記一次巻線および二次巻線は同一磁気回路に配設され、更には前記一次巻線および二次巻線の各対応する巻線部分が前記同一磁気回路を構成する鉄心において近接して配設されることが好ましい。

【００１３】本発明の他の目的は、後述される詳細な説明から明らかにされる。しかしながら、詳細な説明および具体的実施例は最も好ましい実施態様について説明するが、本発明の精神および範囲内の種々の変更および変形はその詳細な説明から当業者にとって明らかであることから、具体的例としてのみ述べるものである。

【００１４】

【実施例】次に、本発明による発電機器の具体的実施例につき順次に図面を参照しつつ説明する。

【００１５】図１および図２において、上下壁を有する円筒形状の固定子枠１０内に同軸状にその固定子枠１０に固定されかつ円環薄鋼板を積層して造られている円環筒状鉄心１１が設けられている。この円環筒状鉄心１１の内周面側には、周方向に等間隔にかつその軸線方向に沿って１２個のスロット１２が形成されている。これらスロット１２内における奥側には、図３に示されているように三相交流電源１３に接続されている一次巻線１４であるＵ１相巻線１４Ａ，Ｖ１相巻線１４ＢおよびＷ１相巻線１４ＣがＹ結線の三相対称巻でもって図４（ａ）に示されているように配され嵌入されている。また、スロット１２内における手前側には、図示されている二次巻線１５であるＵ２相巻線１５Ａ，Ｖ２相巻線１５ＢおよびＷ２相巻線１５Ｃが同様にＹ結線の三相対称巻でもって図４（ｂ）に示されているように配され嵌入されている。

【００１６】ところで、円環筒状鉄心１１内の中空部には、この円環筒状鉄心１１、言い換えれば円筒形状の固定子枠１０の軸芯に位置して固定子枠１０の上下壁に設けられている各孔１６，１７に各ベアリング１８，１９を介して回転自在に支持されている回転軸２０を有してその回転軸２０に同軸状に固定されかつ円環薄鋼板を積層して造られている円柱状鉄心２１が設けられている。この円柱状鉄心２１の外周面側には、周方向に等間隔にかつその軸線方向に沿って同様に１２個のスロット２２が形成されている。これらスロット２２内には、図３に示されている三次巻線２３であるＵ３相巻線２３Ａ，Ｖ３相巻線２３ＢおよびＷ３相巻線２３ＣがＹ結線の三相対称巻でもって図４（ｃ）に示されているように配され嵌入されている。

【００１７】

【化１】

なお、図２および図４（ａ），（ｂ），（ｃ）における符号①～⑫はスロット番号を示している。

こうして、一次巻線１４であるＵ１相巻線１４Ａ，Ｖ１相巻線１４ＢおよびＷ１相巻線１４Ｃに三相交流電源１３から励磁電流として図３および図４（ａ）に示されているように平衡三相交流i_{a1}，i_{b1}，i_{c1}を流すと、これら平衡三相交流i_{a1}，i_{b1}，i_{c1}によって生じる交番磁束により図５に示されているように各交番磁界２４と、平衡三相交流i_{a1}，i_{b1}，i_{c1}の２サイクルの間に時計方向に１回転する回転磁界２５とが生じる。一方、これら各交番磁界２４および回転磁界２５に二次巻線１５であるＵ２相巻線１５Ａ，Ｖ２相巻線１５ＢおよびＷ２相巻線１５Ｃが鎖交され、これらＵ２相巻線１５Ａ，Ｖ２相巻線１５ＢおよびＷ２相巻線１５Ｃには各交番磁界２４および回転磁界２５による起電力が誘導されて図３および図４（ｂ）に示されているように平衡三相交流i_{a2}，i_{b2}，i_{c2}が流れる。なお、この回転磁界２５の回転軸芯に前記回転軸２０が位置されることになる。

【００１８】また、同様に一次巻線１４により生ずる回転磁界２５に三次巻線２３であるＵ３相巻線２３Ａ，Ｖ３相巻線２３ＢおよびＷ３相巻線２３Ｃが鎖交され、これらＵ３相巻線２３Ａ，Ｖ３相巻線２３ＢおよびＷ３相巻線２３Ｃには起電力が誘導されて図３および図４（ｃ）に示されているように平衡三相交流i_{a3}，i_{b3}，i_{c3}が流れる。これら誘導電流i_{a3}，i_{b3}，i_{c3}にもとづく誘導磁界によりそれら回転磁界２５と誘導磁界とによる電磁力でもって円環筒状鉄心１１を固定子側とし、また円柱状鉄心２１を回転子側としてその回転子側としての円柱状鉄心２１が回転駆動される。

【００１９】このようにして、二次巻線１５および三次巻線２３に誘導される起電力は、二次巻線１５においては一次巻線１４による交番磁界２４、更には回転磁界２５による誘導起電力が相加わり、しかも交番磁界２４にもとづき二次巻線１５に誘導される起電力は一次巻線１４に流れた平衡三相交流i_{a1}，i_{b1}，i_{c1}の電力から銅損、鉄損などの若干の損失を差引いたものとほぼ等しくなることから、一次巻線１４に供給した電力よりも大となって自己発電が行われる。

【００２０】また、図６および図７に示されているように、円筒形状の固定子枠１０’内に同軸状にその固定子枠１０’の下壁に固定される前記円環筒状鉄心１１に対応する第１の円環筒状鉄心１１’を設け、この第１の円環筒状鉄心１１’の外周面と固定子枠１０’の内周面との間の円環筒状空間に遊嵌される前記円柱状鉄心２１に対応する第２の円環筒状鉄心２１’を図示されているように円筒枠２６の内側に固定させて設けるようにしても良い。この場合に、第１の円環筒状鉄心１１’の外周面側に奥側に一次巻線１４’、手前側に二次巻線１５’が配されるスロット１２’が形成され、また第２の円環筒状鉄心２１’の内周面側に三次巻線２３’が配されるスロット２２’が形成される他は第２の円環筒状鉄心２１’の回転軸２０’が第１の円環筒状鉄心１１’の中空部においてその第１の円環筒状鉄心１１’の軸芯、言い換えれば回転磁界の回転軸芯に位置されるなどは前述と同様である。

【００２１】なお、本実施例においては、重ね巻の３相交流４極集中（全節）巻の場合を例にして説明したが、６個のスロットにして３相交流２極集中（全節）巻、更には３６個のスロットにして３相交流４極分布（全節）であっても良いことは言うまでもない。また、円環筒状鉄心１１，第１の円環筒状鉄心１１’を固定子側とし、円柱状鉄心２１，第２の円環筒状鉄心２１’を回転子側として説明したが、円環筒状鉄心１１，第１の円環筒状鉄心１１’に回転軸を有させてその円環筒状鉄心１１，１１’を回転子側とし、円柱状鉄心２１，第２の円環筒状鉄心２１’を固定子側としても良い。

【００２２】本実施例においては、スロット１２，１２’内における奥側に一次巻線１４，１４’を配し、手前側に二次巻線１５，１５’を配したが、逆に一次巻線１４，１４’を手前側に二次巻線１５，１５’を奥側に配しても良く、一次巻線１４，１４’および二次巻線１５，１５’を手前側，奥側に区別なく配しても良い。また、Ｙ結線の三相対称巻の場合について説明したが△結線の三相対称巻であっても良い。さらに、重ね巻の場合について説明したが波巻または鎖巻であっても良く、また全節巻の場合について説明したが短節巻であっても良く、言うなれば如何なる巻線方法であっても良い。

【００２３】本実施例においては、鉄心１１，１１’，２１，２１’を薄鋼板を積層して造ったが、巻いて造っても良く、塊状であっても良く、フェライトを焼固して造っても良く、言うなれば磁性体で構成されるものであれば如何なるものであっても良い。

【００２４】本実施例においては、一次巻線１４，１４’を三相巻として励磁電流を流すために三相交流電源１３を用いたが励磁電流を流すために単相交流電源を用いてコンデンサ分相形、リアクタンス分相形、またはくまとりコイル形に構成して一次巻線１４，１４’を二相巻の構成としても良い。また、図８に示されているように一次巻線１４”を３個の巻線による単相巻１４”Ａ，１４”Ｂ，１４”Ｃとして直流電源３０を用いて６個のSCR_1～SCR_6から構成されるスイッチ回路３１を介して励磁電流i_{a1}，i_{b1}，i_{c1}を順次に断続的に流すようにしても良い。なお、二次巻線１５，１５’および三次巻線２３，２３’は、一次巻線１４，１４’の単相巻，二相巻，三相巻などに対応させて同様の単相巻，二相巻，三相巻などとすれば良い。

【００２５】本実施例においては、二次巻線１５，１５’に誘導される起電力は、一次巻線１４’１４に生じる交番磁束にもとづく交番磁界２４および回転磁界２５に二次巻線１５，１５’が鎖交されることによるが、前記交番磁界２４のみに二次巻線１５，１５’が鎖交されるように構成しても良いことは言うまでもない。また、本実施例においては、三次巻線２３，２３’に誘導される起電力は、一次巻線１４，１４’に生じる交番磁束にもとづく回転磁界２５に三次巻線２３，２３’が鎖交されることによるが、この回転磁界２５に加えて前記交番磁束にもとづく交番磁界２４にも鎖交するように構成しても良いことは言うまでもない。

【００２６】前述の各実施例および各変形例において二次巻線１５，１５’および／または三次巻線２３，２３’に誘導される起電力の少なくとも一部を一次巻線１４，１４’に供給すれば、初期の始動時を除き外部からの電気エネルギーの供給を必要とすることなく自己発電、更には誘導電動機としても機能を有する。また、一次巻線１４，１４’に流れる電流の周期を短くして交番磁界２４の交番数および回転磁界２５の回転数を大とすれば、また多相巻の相数が増すにつれて二次巻線１５，１５’および三次巻線２３，２３’に誘導される起電力は大となることは言うまでもない。なお、一次巻線１４，１４’，二次巻線１５，１５’および三次巻線２３，２３’において回転子側に配される場合には、供給される電流および誘導される起電力は、スリップリングを介して供給または取り出すことができる。

【００２７】本発明によれば、自然環境を破壊することなくかつ安定して電気エネルギーを供給し得る自己発電ができ、しかも初期の始動時を除き外部からの電気エネルギーの供給を必要とすることなく自己発電が行い得る。したがって、従来の水力発電機器，火力発電機器，原子力発電機器，太陽発電機器，風力発電機器、電池などに替わって電気エネルギーを供給することができることは勿論、特にその電気エネルギーでもってモータを駆動させているような民生用を含め全ての電気機器において極めて有用である。

【００２８】以上に説明したように、本発明は、種々に変更可能なことは明らかである。このような変更は本発明の精神および範囲に反することなく、また当業者にとって明瞭な全てのそのような変形、変更は請求の範囲に含まれるものである。

【図面の簡単な説明】

【図１】図１は、本発明による発電機器の第１実施例を説明するための縦断面図である。

【図２】図２は、図１において説明した発電機器の横断面図である。

【図３】図３は、図１において説明した回路図である。

【図４】図４（ａ），（ｂ），（ｃ）は、図１において説明した巻線図である。

【図５】図５は、図１において説明した回転磁界の発生図である。

【図６】図６は、本発明による発電機器の第２実施例を説明するための縦断面図である。

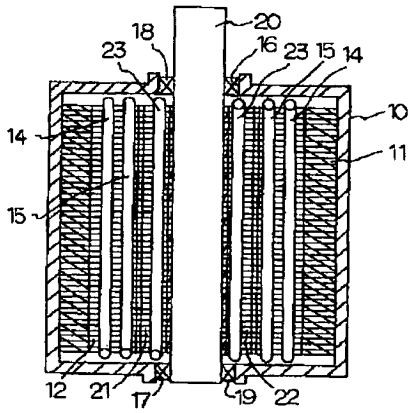
【図７】図７は、図６において説明した発電機器の横断面図である。

【図８】図８は、本発明による発電機器における一次巻線に励磁電流を供給する際の変形例を説明するための回路図である。

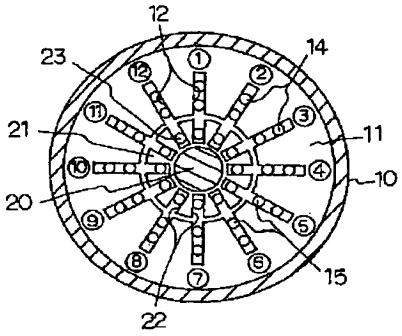
【符号の説明】

１０，１０’	固定子枠
１１，１１’	円環筒状鉄心（第１の円環筒状鉄心）
１２，２２，１２’，２２’	スロット
１３	三相交流電源
１４，１４’，１４”	一次巻線
１５，１５’	二次巻線
１６，１７	孔
１８，１９	ベアリング
２０，２０’	回転軸
２１，２１’	円柱状鉄心（第２の円柱状鉄心）
２３，２３’	三次巻線
２４	交番磁界
２５	回転磁界
２６	円筒枠
３０	直流電源
３１	スイッチ回路

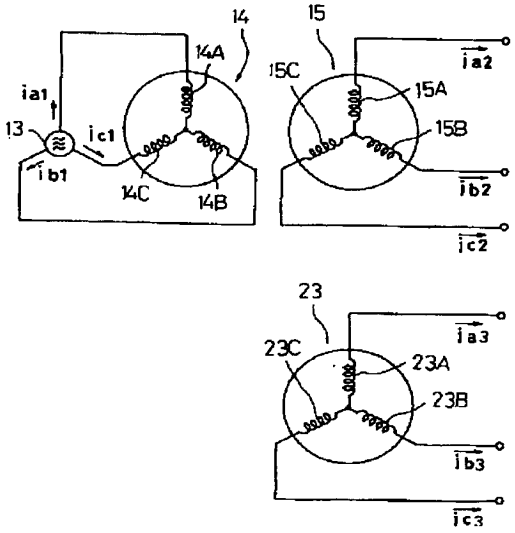
【図1】


18
20
23
16
23
15
14
14
10
11
15
12
21
17
19
22

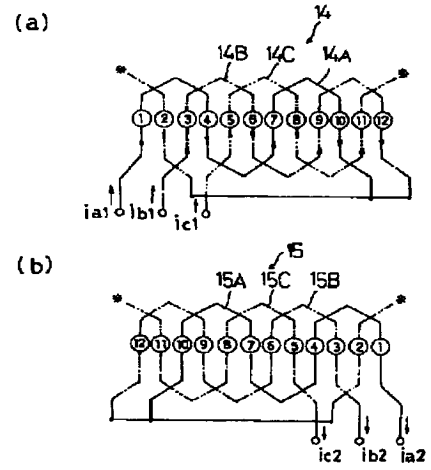
【図2】


12
14
23
21
11
10
20
15
22

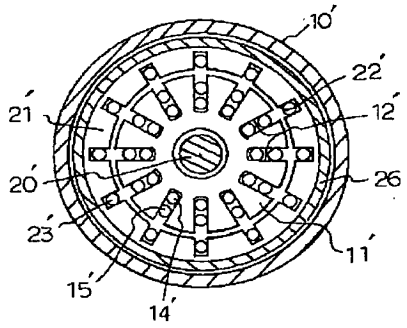
【図3】


14
15
14A
15C
15A
15B
ia1
13
ic1
ib1
14C
14B
ia2
ib2
ic2
23
23C
23A
23B
ia3
ib3
ic3

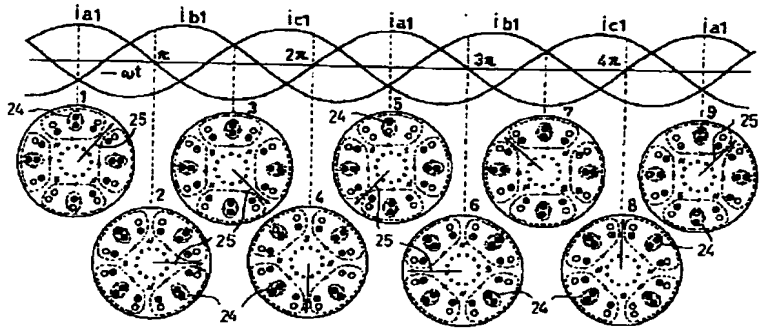
【図4】


(a)
14
14B
14C
14A
ia1
ib1
ic1
(b)
15
15A
15C
15B
ic2
ib2
ia2
(c)
23
23A
23C
23B
ic3
ib3
ia3

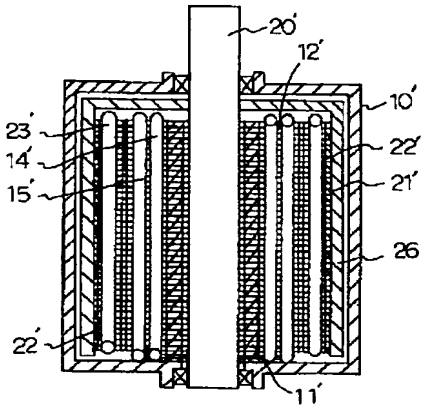
【図7】


10
22
21
12
20
26
23
11
15
14

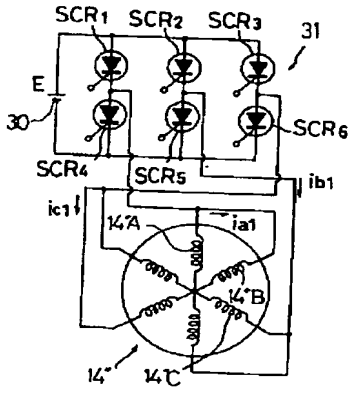
【図５】


ia1
ib1
ic1
ia1
ib1
ic1
ia1
−ωt
π
2π
3π
4π
1
2
3
4
5
6
7
8
9
24
25

【図６】


20'
12'
10'
23'
14'
15'
22'
21'
26
22'
11'

【図８】


SCR1
SCR2
SCR3
31
E
30
SCR6
SCR4
SCR5
ib1
ic1
14'A
ia1
14'B
14'
14'C